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## CERTIFICATION

It is hereby declared that the translation of Korean priority application No. 2003-0031020 filed on May 15, 2003 is true and correct.

Seoul, November 21, 2008  
Translator: Woo Su-Won

A handwritten signature in black ink, appearing to read "Woo Su-Won", written over the printed name of the translator.

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## **【ABSTRACT OF THE DISCLOSURE】**

### **【SUMMARY】**

This is invention of a swivel hinge assembly and a portable electronic device having the same. The swivel hinge assembly in the present invention, comprising: a first frame 51; a second frame 55, including a base 56 which is mounted on the first frame 51 to rotate horizontally about a first vertical axis 52 of rotation with respect to the first frame 51 and is formed with cutout portion 56c; and a vertical rotary shaft 58 which is installed to penetrate through a rotary portion-housing 57 formed to protrude across the center of a top surface of the base 56 and is vertically rotated about a second horizontal axis of rotation orthogonal to the first axis of rotation with respect to the first frame 51. And the swivel hinge assembly 50 for connecting the main body 10 and the display unit 30, allows the display unit 30 to be vertically and horizontally rotated with respect to the main body 10.

### **15   【REPRESENTATIVE DRAWING】**

Fig. 2

### **【INDEX】**

Portable, Electronic device, Swivel hinge

5

## **【DESCRIPTION】**

### **【TITLE OF THE INVENTION】**

Swivel hinge assembly and portable electronic device having the same

### **【BRIEF DESCRIPTION OF THE DRAWINGS】**

10        FIG. 1a is a schematic perspective view of a conventional portable electronic device having a swivel hinge assembly according to a prior art.

FIG. 1b is a schematic perspective view of a conventional portable electronic device having a swivel hinge assembly according to another prior art.

FIG. 1c is a perspective view showing a rear surface of a display unit  
15    folded to face a main body according to a prior art.

FIG. 2 is a rear perspective view of a portable electronic device having a swivel hinge assembly according to an embodiment of the present invention;

FIG. 3 is a front perspective view of the portable electronic device

according to an embodiment of the present invention;

FIG. 4 is a perspective view of the portable electronic device in a folded state according to an embodiment of the present invention;

FIG. 5 is a perspective view of the swivel hinge assembly according to an  
5 embodiment of the present invention;

FIG. 6 is a side view of the swivel hinge assembly according to an embodiment of the present invention;

FIG. 7 is a perspective view of showing a state in which a display unit is rotated substantially horizontally in a portable electronic device in accordance  
10 with an embodiment of the present invention;

FIG. 8 is perspective view of showing a state in which a rear surface of the display unit is securely seated on a top surface of a main body in the portable electronic device in accordance with an embodiment of the present invention;

15 FIG. 9 to 11 sequentially show a motion of a cover plate according to the operation of a swivel hinge assembly in accordance with an embodiment of the present invention.

\* Description of symbols of major parts in the drawings \*

	10: main body	20: key board
	30: display unit	40: tilting stand
	42: support bar	43: hinge connection bar
	45: stylus pen	47: pen reception portion
5	50: swivel hinge assembly	51: first frame
	52: horizontal rotary shaft	53: fixing fin
	55: second frame	56: base
	56c: cutout portion	56r: rounded portion
	57: rotary portion-housing	58: vertical rotary shaft
10	59: connection bar	60: cover plate
	61: connection leg	62: stepped portion
	64: supporting portion	66: elastic member

#### **【DETAILED DESCRIPTION OF THE INVENTION】**

#### **【PURPOSE OF THE INVENTION】**

#### **15 【TECHNICAL FIELD IN WHICH THE INVENTION IS INCLUDED AND THE PRIOR ART IN THAT FIELD】**

The present invention relates to an electronic device, and more particularly, to a swivel hinge assembly and a portable electronic device having

the same, which are composed of a display unit and body unit. Not only the display unit is pivoted to be unfolded with respect to the body unit but also rotated horizontally when the display is tilted.

A combined notebook and tablet computer are described herein as an  
5 example of a portable electronic device. However, the invention can also be applied to a variety of electronic device, including portable electronic devices, such as notebook computers, mobile phones, and tablet computers, for which it is desirable that a display unit and main body thereof be folded to face each other and unfolded to move away from each other.

10 FIG. 1 is a schematic perspective view of a conventional portable electronic device having a swivel hinge. Referring to the drawing, a variety of parts, such as a main board and a hard disk drive, are installed in a main body 1. A keyboard 3 which functions as an input device is provided on a top surface of the main body 1. A display unit 5 is connected to an end of the main body 1.  
15 Generally, a liquid crystal display (LCD) is used as the display unit 5; however, other types of display units may also be appropriate.

The display unit 5 can be folded or unfolded with respect to the main body 1, and can also be rotated horizontally as viewed from the front of the main body 1. This is possible because the main body 1 and the display unit 5 are  
20 connected to each other by a swivel hinge assembly 7.

The swivel hinge assembly 7 allows the display unit 5 to be rotated



horizontally about a rotary plate 7r. An end of a connection plate 7c is connected to the rotary plate 7r. A center of rotation in the forward and backward directions is positioned along a tangential direction of a circular arc defined by and at the periphery of the rotary plate 7r.

5           In such a prior art, the display unit 5 is pivoted in a forward and backward direction on the top surface of the main body 1. That is, pivoted about the horizontally extending axis of rotation on the one end of the connection plate 7c, to be folded or unfolded with respect to the main body 1. At the same time, the display unit 5 is rotated horizontally about a vertically extending axis of  
10   rotation provided on the rotary plate 7r.

Therefore, the display unit 5 can be used in various rotated states. More particularly, the display unit 5 can be used in a state in which a rear surface thereof is in close contact with the top surface of the main body 1, thus, the display unit 5 may be used as a tablet computer.

15           However, there are the following problems in the prior art.

Since the rotary plate 7r of the swivel hinge assembly 7 is the shape of a circle, the swivel assembly 7 occupies a large area on the top surface of the main body 1. Therefore, the keyboard 3 cannot be installed in at least a portion having a width corresponding to a diameter of the rotary plate 7r. In other words,  
20   right and left areas on the top surface of the main body 1 with respect to the rotary plate 7r are not available for placement of the keyboard 3.

Further, there is the inconvenience in the prior art that the keyboard 3 is located near the front end of the main body 1 and thus there are no portions for supporting the wrists of a user when the user presses the keys of the keyboard 3. To solve the aforementioned problems, the swivel hinge assembly 7 must be formed to protrude from the rear end of the main body 1. However, if the swivel hinge assembly 7 protrudes from the rear end of the main body 1, an external appearance of the device is not suitable for design purposes. Further, the display unit 5 is unstable since display unit 5 may be positioned beyond the rear end of the main body 1.

10 **【TECHNICAL TASK WHICH THE PRESENT INVENTION TRIES TO BE OBTAINED】**

Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide a relatively small size of the swivel assembly.

15 Another object of the present invention is to raise the degree of freedom of design for a main body in an electronic device employing a swivel hinge assembly.

A further object of the present invention is to use space of the rear end of the display unit and the main body in the electronic employing a swivel hinge

assembly.

A still further object of the present invention is to provide an external design of an electronic employing a swivel hinge assembly which is more beautiful than prior art devices.

5     **【CONSTITUTION OF THE INVENTION】**

In order to accomplish these objects, there is provided A swivel hinge assembly, comprising: a first frame; a second frame, including a base which is mounted on the first frame to rotate horizontally about a first vertical axis of rotation with respect to the first frame and is formed with cutout portion; and a vertical rotary  
10     shaft which is installed to penetrate through a rotary portion-housing formed to protrude across the center of a top surface of the base and is vertically rotated about a second horizontal axis of rotation orthogonal to the first vertical axis of rotation with respect to the first frame.

The cutout portion of the base is symmetrically formed at both ends of  
15     the base.

Further comprising a cover plate takes the shape of an arcuation as the cutout portion of the base.

The cover plate is supported to the first frame by an elastic member, and

a top surface of the cover plate is in the same level as the top surface of the base.

An inclined guide plane is corresponding formed at a portion corresponding to the cutout portion of the base and the cover plate, and a  
5 stepped portion is formed at surrounding the edge of the cover plate other than the inclined guide plane.

The first frame as viewed from a plane view, is positioned on inside of the range of the second frame.

A plurality of fixing pins for fixing the first frame are formed on a bottom  
10 surface of the first frame.

In accordance with another aspect of the present invention, there is provided a portable electronic device, comprising; a main body that is provided with at least one input device on a top surface thereof; a display unit is connected to the main body and on which input information is displayed; and a  
15 swivel hinge assembly which connects the main body and display unit, allows the display unit to be horizontally and vertically rotated as viewed from the front of the main body, and is formed such that axes of rotation in horizontally and vertical directions are orthogonal to each other on the same plane.

The swivel hinge assembly comprises a first frame fixed to the main body, a second frame which is connected to the display unit to be horizontally rotated with respect to the first frame, and a vertical rotary shaft which is provided to penetrate transversely through the center of the second frame and functions to allow the display unit to be vertically rotated, and wherein the second frame is formed with cutout portions at a portion thereof corresponding to a rear end of the main body and an opposite portion thereof.

In accordance with another aspect of the present invention, there is provided a portable electronic device, comprising: a portable electronic device, comprising: a main body that is provided with at least one input device on a top surface thereof; a display unit is connected to the main body and on which input information is displayed; and a swivel hinge assembly which connects the main body and the first frame, and connects the display unit and the second frame, allows the display unit to be horizontally and vertically rotated as viewed from the front of the main body, and a second frame is formed with cutout portions corresponding to vertical direction of the main body.

A cover plate for covering a region of the opening which is formed according to cutout portions, and one side of the cover plate is supported by

an elastic member, and selectively opened according to a horizontal rotation of the second frame.

The cover plate is provided in the swivel hinge assembly.

The cover plate is provided in the main body.

5 The display unit is a tablet computer.

As mentioned above, the inventive swivel hinge assembly and a portable electronic device having the same have the following advantages.

The present invention is to improve the degree of freedom of design for a main body in an electronic device employing a swivel hinge assembly, to  
10 make the best use of a main body in an electronic device employing a swivel hinge assembly, and to cause an external design of an electronic device employing a swivel hinge assembly to be more simple and beautiful.

Hereinafter, preferred embodiments of a swivel hinge assembly and a portable electronic device having the same according to the present invention  
15 will be described in detail with reference to the accompanying drawings.

FIG. 2 is a rear perspective view of a portable electronic device having a swivel hinge assembly according to an embodiment of the invention, FIG. 3 is a front perspective view of the portable electronic device according to an embodiment of the invention, and FIG. 4 is a perspective view of the portable  
20 electronic device in a folded state according to an embodiment of the invention.

FIG. 5 is a perspective view of the swivel hinge assembly according to an embodiment of the invention, and FIG. 6 is a side view of the swivel hinge assembly according to an embodiment of the invention;

Referring to the drawings, the portable electronic device of the present invention includes a main body 10 and a display unit 30 that are generally folded or unfolded with respect to each other, similarly to a so-called notebook computer. A keyboard 20 is provided on a top surface of the main body 10. The keyboard 20 is a kind of input device and consists of a plurality of keys for inputting characters, numerals, symbols and the like. Another input device such as a touchpad or pointing stick may be provided on the top surface of the main body 10. The parts including a main board, a hard disk drive and the like can be installed within the main body 10.

Further, a touch screen or liquid crystal display (LCD) can be used as the display unit 30. In this embodiment of the present invention, the display unit 30 may be configured in the form of a tablet computer. In such a case, since a touch screen is employed in the display unit 30, the input can be made through the display unit 30 itself.

In addition, the main body 10 and the display unit 30 can be variously combined with each other in view of their functions. For example, similarly to a notebook computer, a main board, a hard disk drive and the like can be

contained in the main body 10 whereas the display unit 30 may be configured in the form of a tablet computer and the main body 10 may be provide with an additional input device without a main board.

Furthermore, a tilting stand 40 may be provided on a rear end of the  
5 main body 10 where the main body 10 and the display unit 30 are connected with each other. The tilting stand 40 causes the rear end of the main body 10 to be relatively higher than front end thereof. That is, such a use of the tilting stand 40 makes the rear end of the keyboard 20 higher than the front end thereof, which results in an easier keying operation.

10 The tilting stand 40 comprises a support bar 42 that has a length corresponding to a lateral width of the main body 10 and is selectively supported on the floor or ground, and a hinge connection bar 43 that extend vertically from the support bar 42 and is hingedly connected to the main body 10. A leading end of the hinge connection bar 43 is pivotally connected to the  
15 main body through a hinge (not shown) and the other end thereof is connected to the support bar 42. It is preferred that at least two hinge connection bars 43 be provided in consideration of the length of the support bar 42. Preferably, the hinge for allowing the support bar 42 to be connected to the main body 10 is configured such that the tilting stand 20 can be rotated only when a force  
20 greater than a specific value is applied thereto. The reason is that the tilting stand 40 cannot be inadvertently rotated due to a small external force applied



thereto during its use.

The tilting stand 40 provided on the rear end of the main body 10 is securely seated on a rear end of the top surface of the main body 10 when it is not in use, as shown in FIG. 4. When the tilting stand is in use, i.e. when the  
5 main body 10 is used in an inclined state, the tilting stand 40 is supported on the floor, as shown in FIG. 2.

The tilting stand 40 is formed with a pen reception portion 47 is formed in a longitudinal direction of the support bar 42, and is preferably formed such that its entrance hole is provided on an end of the tilting stand 40. The stylus pen 45  
10 that is inserted into the pen reception portion 47 is need when the display unit 30 is configured in the form of the tablet computer.

FIG. 5 and FIG. 6 show a swivel hinge assembly 50 for connecting the main body 10 and the display unit 30 according to another embodiment of the present invention. The swivel hinge assembly 50 allows the display unit 30 to be  
15 vertically and horizontally rotated, as viewed form the front of the main body 10.

Hereinafter, the configuration of the swivel hinge assembly 50 will be discussed. The swivel hinge assembly 50 generally comprises a first frame 51 that is mounted on the main body 10, and a second frame 55 that is rotated relative to the first frame 51 and connected with the display unit 30 to move

together with the display unit 30.

The first frame 51 is fixed to the main body 10 and provided with a horizontal rotary shaft 52 on a top surface thereof. The horizontal rotary shaft 52 becomes a vertical axis of rotation about which the display unit 30 is horizontally  
5 rotated. A plurality of fixing pins 53 are formed to protrude from a bottom surface of the first frame 51. The fixing pins 53 are fitted into corresponding recesses in the main body 10 so that the swivel hinge assembly 50 can be firmly fixed to the main body 10.

The second frame 55 is rotated about the horizontal rotary shaft 52 with  
10 respect to the first frame 51. The second frame 55 is provided with a roughly disc-shaped base 56. The base 56 is configured to have rounded portions 56a with a predetermined radius of curvature and straightly formed cutout portions 56c. The cutout portions 56c are symmetrically formed at opposite sides of the base 56. In other words, the base 56 takes the shape of a circle of the cutout  
15 portions 56c are cutout as viewed from above in a plan view.

As viewed from the front of the main body 10, the cutout portions 56c do not protrude from the rear end of main body 10 but define a portion of the rear end of the main body 10 in a state where the display unit 30 is not rotated or

has been rotated at 180 degrees in a horizontal direction.

A rotary portion-housing 57 is formed on a top surface of the base 56 in a state where it runs across the center of the top surface of the base and in parallel with the cutout portions 56c. The rotary portion-housing 57 has a rounded external surface. Both ends of the rotary portion-housing 57 are open and the interior of the housing can be penetrated in a longitudinal direction. Further, the rotary portion-housing 57 is placed into a corresponding recess in the display unit 30.

The horizontal rotary shaft 52 is placed at the center of the rotary portion-housing 57. Further, a vertical rotary shaft 58 is installed within the longitudinally penetrated hole of the rotary portion-housing 57. The vertical rotary shaft 58 becomes a horizontal axis of rotation about which the display unit 30 is vertically rotated. Connection bars 59 for connection with the display unit 30 are provided on both ends of the vertical rotary shaft 58. The connection bars 59 are fastened with fastening means such as screws to the display unit 30 so that both the vertical rotary shaft 58 and the display unit 30 can be simultaneously rotated with respect to the second frame 55. At this time, it is preferred that the display unit 30 can be rotated about the vertical rotary shaft 58 only when a

predetermined force is applied thereto.

The second frame 55 is fastened to the display unit 30, whereas the base 56 is placed at the side of the main body 10. Therefore, to allow the base 56 to be smoothly rotated, an opening having a diameter corresponding to that of the base 56 should be formed on the main body 10. But the main body 10 is opened at regions corresponding to the cutout portions 56c in a state where the display unit 30 is not rotated or has been rotated at 180 degrees in a horizontal direction.

To cover the opened regions, a cover plate 60 is employed in the present invention. The cover plate 60 is connected to the first frame 51, and received into the main body 10 while the second frame 55 rotates. When the display unit 30 is not rotated or has been rotated at 180 degrees, the opened region is also covered with the cover plate 60. Accordingly, the cover plate 60 takes an arcuation corresponding to the length of the cutout portion 56c, and the length of the cutout portion 56c takes the length of the chord.

A connection leg 61 extends downward from the cover plate 60, and a tip end of the connection leg 61 is pivotally installed to a supporting portion 64 of the first frame 51 through a hinge pin 61p. The supporting portion 64 may be

integrally formed with the first frame 51.

The cover plate 60 is formed with a stepped portion 62 along the rounded periphery thereof. The stepped portion 62 is placed into the main body 10, and thus, a top surface of the cover plate 60 is in the same level as that of the base 56 when the opened region is covered with the cover plate 60. An inclined guide plane 62' is formed at a region on the cover plate 60 corresponding to the cutout portion 56c. The inclined guide plane 62' is formed to be inclined downward toward the cutout portion 56c. The cutout portion 56c also has a corresponding inclined plane 56c'.

An elastic force is exerted on the cover plate 60 by means of an elastic member 66 fixed to the supporting portion 64. The elastic member 66 exerts the elastic force on the cover plate 60 in such a direction that the top surface of the cover plate 60 is in the same level as that of the base 56.

Hereinafter, the operation of the swivel hinge assembly and the portable electronic device having the same so constructed according to the present invention will be described in detail.

A state where the portable electronic device of the present invention is used will be first explained. FIG. 4 shows a state where the main body 10 and

the display unit 30 are folded to face each other. This state corresponds to a case where a user carries the portable electronic device.

FIGS. 2 and 3 show a state where the display unit 30 has been vertically rotated about the vertical rotary shaft 58. This state corresponds to a case where a user performs an input operation through the keyboard 20 and the like. Even in such a case, of course, the user can also performs the input operation while bringing the stylus pen 45 into contact with the top surface of the display unit 30.

FIG. 7 shows a state where the display unit 30 has been horizontally rotated about the horizontal rotary 52 in a state shown in FIGS. 2 and 3. That is, the display unit 30 has been vertically rotated about the vertical rotary shaft 58 and then horizontally rotated about the horizontal rotary shaft 52. The rotation of the display unit 30 about the vertical rotary shaft 58 can be made up to about 180 degrees, whereas the rotation thereof about the horizontal rotary shaft 52 can be made up to 360 degrees.

Further, FIG. 8 shows a state where a rear surface of the display unit 30 is securely seated on the top surface 10 so that a front surface of the display unit 30 faces upwards when the portable electronic device has been placed on

the floor. This state corresponds to a case where the display unit 30 is configured in the form of a tablet computer. In such a state, the input operation can be made through the display unit 30 by using the stylus pen 45.

Furthermore, the input operation through the keyboard 20 can be readily  
5 made by causing the rear end of the main body 10 to be relatively higher than the front end thereof. To this end, the tilting stand 40 is unfolded from the rear end of the main body 10 and is then simply supported on the floor. This state is illustrated in FIGs. 2 and 3.

In a state where the tilting stand 40 as shown in FIGs. 4 or 8, the tilting  
10 stand 40 functions to prevent the display unit 30 from being unnecessarily or inadvertently rotated about the horizontal rotary shaft 52. That is, since the tilting stand 40 is securely seated on the rear end of the main body 10 and holds one end of the display unit 30 in a place, the display unit 30 can be prevented from being arbitrarily rotated.

15 Next, in a case where the display unit 30 is rotated about the horizontal rotary shaft 52, the cover plate 60 will be operated. First, when the display unit 30 is not rotated or has been rotated at 180 degrees as shown in FIGs. 2 and 3, the cover plate 60 will be in the same level as the top surface of the main body

10. This state can also be found in FIGs. 5 and 6. Accordingly, the swivel hinge assembly installed on the opening in the main body 10 has been covered.

The cover plate 60 is raised and/or lowered by means of the rotation of the display unit 30, i.e. the rotation of the base 56. When the display unit 30  
5 begins to rotate about the horizontal rotary shaft 52 from the state shown in FIGs. 2 and 3, the inclined plane 56c' of the cutout portion 56c that was in contact with the inclined guide plane 62' of the cover plate 60 begins to push the inclined guide plane 62' of the cover plate 60. Thus, the cover plate 60 begins to be pivoted on the hinge pin 61p and to descend while overcoming the  
10 elastic force from the elastic member 66. This state is illustrated in FIGs. 9a and 9b.

When the display unit 30 is further rotated, the cover plate 60 is kept to be pressed down by a bottom surface of the base 56 as shown in FIGs. 10a and 10b. And, FIGs. 11a and 11b show a state where the display unit 30 has  
15 been rotated at 90 degrees. In such a state, the cover plate 60 is still kept to be pressed down by the bottom surface of the base 56.

Furthermore, when the display unit 30 is further rotated at 90 degrees from the state shown in FIGs. 11a and 11b, the cover plate 60 is no longer



pressed down by the base 56. Thus, the cover plate 60 is restored to an original state by means of the restoring force of the elastic member 66 and allows the opening of the main body 10 to be covered again.

Although a preferred embodiment of the present invention has been  
5 described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

For example, The cover plate may be installed to the main body to be  
10 resiliently supported by the elastic member instead of being installed at the first frame so that it can com into and out of the opening and cover the opening according to the rotation of the base.

#### **【EFFECT OF THE INVENTION】**

As mentioned above, the inventive swivel hinge assembly and a portable  
15 electronic device having the same has following advantage.

According to the present invention, since the cutout portions are formed at both ends of the base of the swivel hinge assembly, there is an advantage in that the size of the swivel hinge assembly can be relatively small.

Moreover, since the vertical and horizontal axes of rotation for the swivel hinge assembly of the present invention are not offset from each other, the display unit can be rotated in a state where the position of the display unit relative to the main body is not changed. Therefore, there is another advantage  
5 in that the degree of freedom of design for the top surface of the main body can be improved.

In addition, since the area that the swivel hinge assembly occupies on the main body is further reduced, the keyboard can be shifted as rearward as possible on the top surface of the main body. Therefore, there is a further  
10 advantage in that the keying operation can be more conveniently performed.

Furthermore, the opening for allowing the base of the swivel hinge assembly to be smoothly rotated can be covered with the cover plate and the swivel hinge assembly does not protrude toward the rear of the main body in the present invention. Therefore, there is a still further advantage in that the  
15 external design can be beautiful.

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**【WHAT IS CLAIMED IS】**

**【CLAIM 1】**

20           A swivel hinge assembly, comprising:

a first frame;

a second frame, including a base which is mounted on the first frame to rotate horizontally about a first vertical axis of rotation with respect to the first frame and is formed with cutout portion; and

5 a vertical rotary shaft which is installed to penetrate through a rotary portion-housing formed to protrude across the center of a top surface of the base and is vertically rotated about a second horizontal axis of rotation orthogonal to the first vertical axis of rotation with respect to the first frame.

**【CLAIM 2】**

10 The swivel hinge assembly as claimed in claim 1, wherein the cutout portion of the base is symmetrically formed at both ends of the base.

**【CLAIM 3】**

The swivel hinge assembly as claimed in claim 1 or 2, further comprising a cover plate which takes the shape of an arcuation as the cutout  
15 portion of the base.

**【CLAIM 4】**

The swivel hinge assembly as claimed in claim 3, wherein the cover plate is supported to the first frame by an elastic member, and a top surface of

the cover plate is in the same level as the top surface of the base.

**【CLAIM 5】**

The swivel hinge assembly as claimed in claim 4, wherein an inclined  
guide plane is corresponding formed at a portion corresponding to the cutout  
5 portion of the base and the cover plate, and a stepped portion is formed at  
surrounding the edge of the cover plate other than the inclined guide plane.

**【CLAIM 6】**

The swivel hinge assembly as claimed in claim 1, wherein the first  
frame as viewed from a plane view, is positioned on inside of the range of the  
10 second frame.

**【CLAIM 7】**

The swivel hinge assembly as claimed in claim 1 or 6, wherein a  
plurality of fixing pins for fixing the first frame are formed on a bottom surface of  
the first frame.

15 **【CLAIM 8】**

A portable electronic device, comprising;  
  
a main body that is provided with at least one input device on a top  
surface thereof;

a display unit is connected to the main body and on which input information is displayed; and

a swivel hinge assembly which connects the main body and display unit, allows the display unit to be horizontally and vertically rotated as viewed  
5 from the front of the main body, and is formed such that axes of rotation in horizontally and vertical directions are orthogonal to each other on the same plane.

**【CLAIM 9】**

The portable electronic device as claimed in claim 8, wherein the  
10 swivel hinge assembly comprises a first frame fixed to the main body, a second frame which is connected to the display unit to be horizontally rotated with respect to the first frame, and a vertical rotary shaft which is provided to penetrate transversely through the center of the second frame and functions to allow the display unit to be vertically rotated, and wherein the second frame is  
15 formed with cutout portions at a portion thereof corresponding to a rear end of the main body and an opposite portion thereof.

**【CLAIM 10】**

A portable electronic device, comprising:

a main body that is provided with at least one input device on a top surface thereof;

a display unit is connected to the main body and on which input information is displayed; and

5 a swivel hinge assembly which connects the main body and the first frame, and connects the display unit and the second frame, allows the display unit to be horizontally and vertically rotated as viewed from the front of the main body, and a second frame is formed with cutout portions corresponding to vertical direction of the main body.

10 **【CLAIM 11】**

The portable electronic device as claimed in claim 9 or 10, wherein a cover plate for covering a region of the opening which is formed according to cutout portions, and one side of the cover plate is supported by an elastic member, and selectively opened according to a horizontal rotation of the  
15 second frame.

**【CLAIM 12】**

The portable electronic device as claimed in claim 9 or 10, wherein the cover plate is provided in the swivel hinge assembly.

**【CLAIM 13】**

The portable electronic device as claimed in claim 9 or 10, wherein the cover plate is provided in the main body.

**【CLAIM 14】**

5           The portable electronic device as claimed in claim 9 or 10, wherein the display unit is a tablet computer.



FIG. 1a

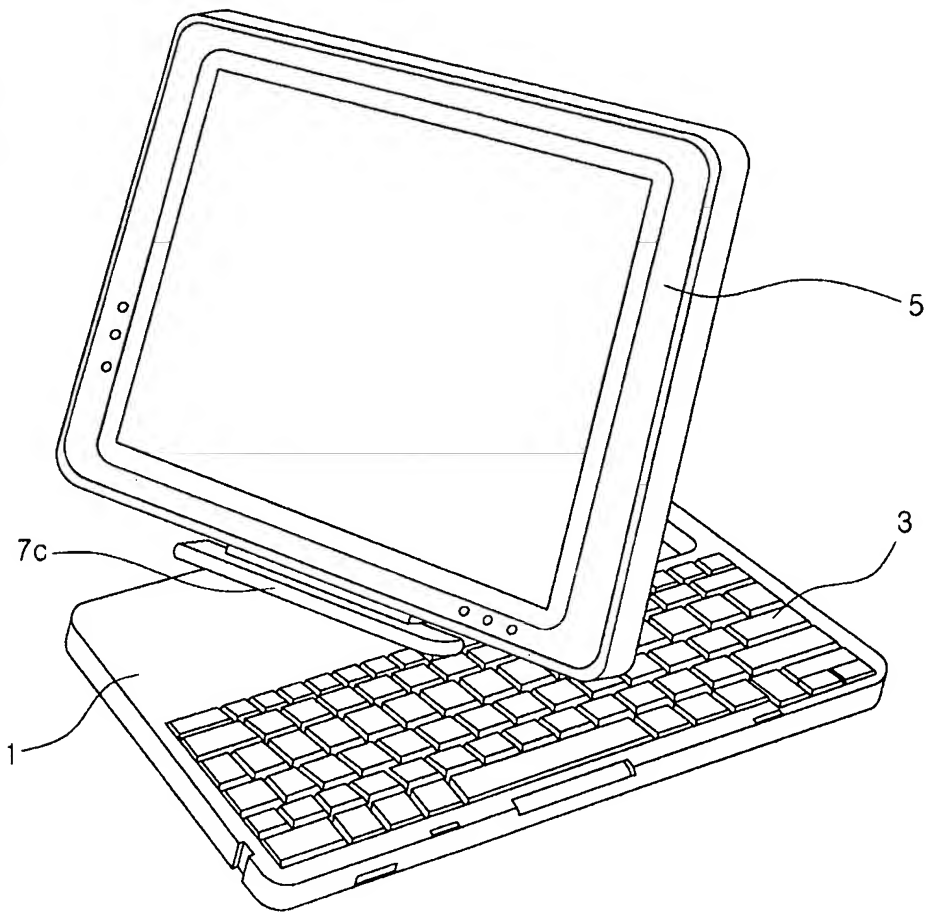


FIG. 1b

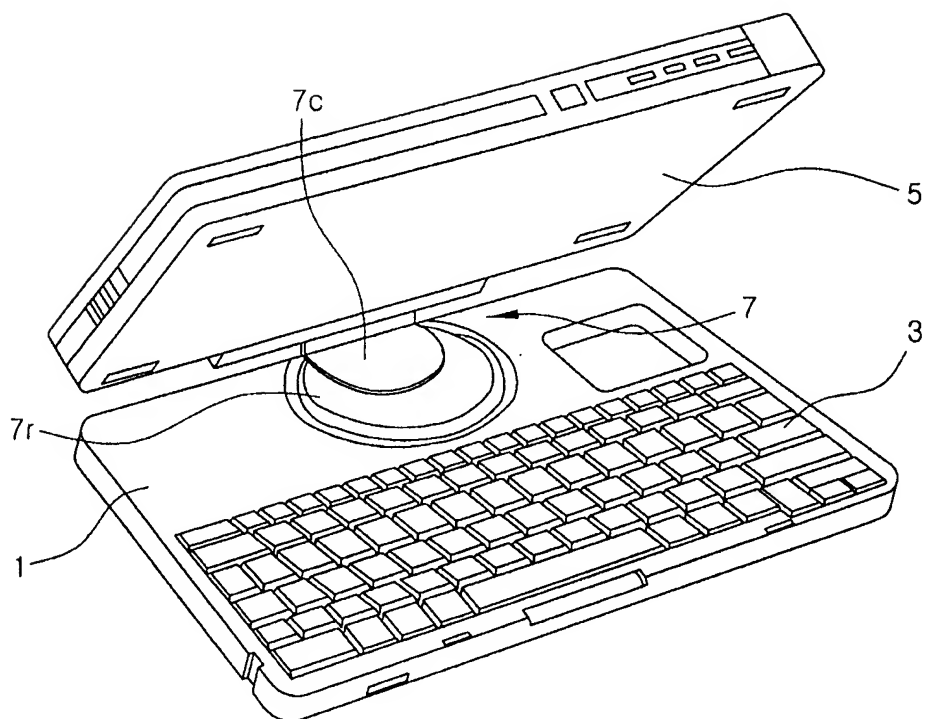


FIG. 1c

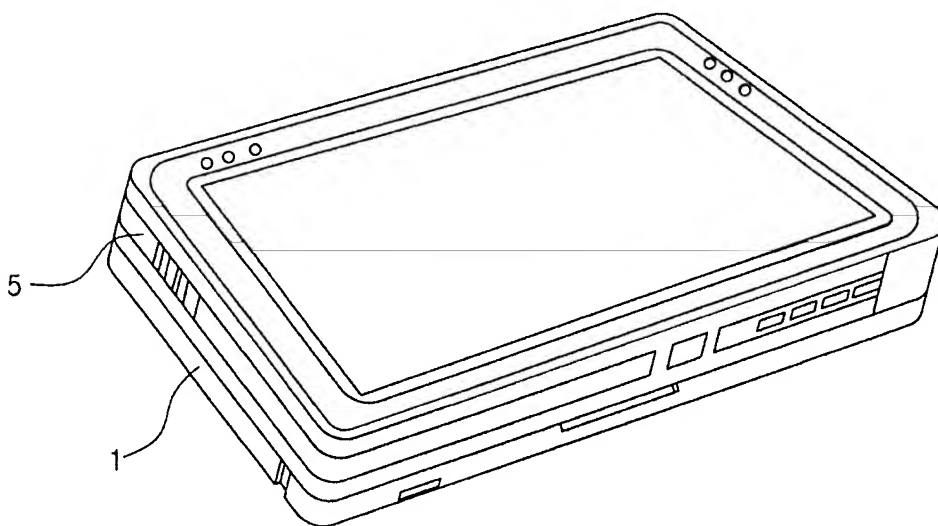


FIG. 2

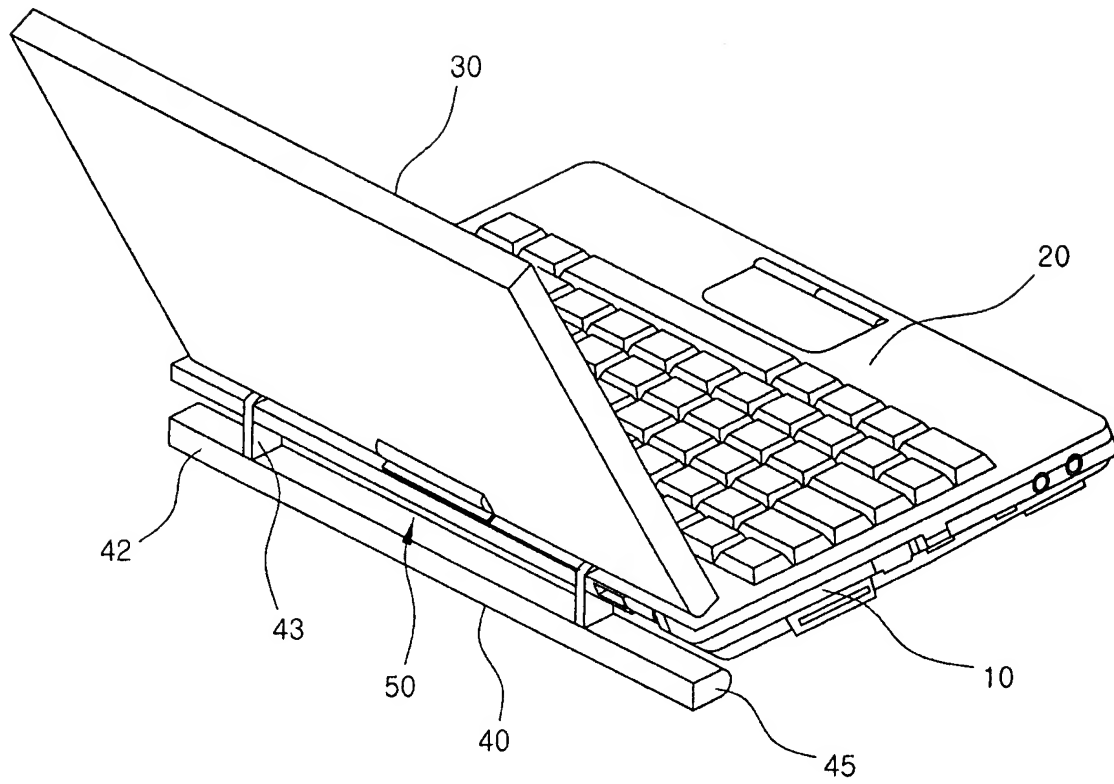


FIG. 3

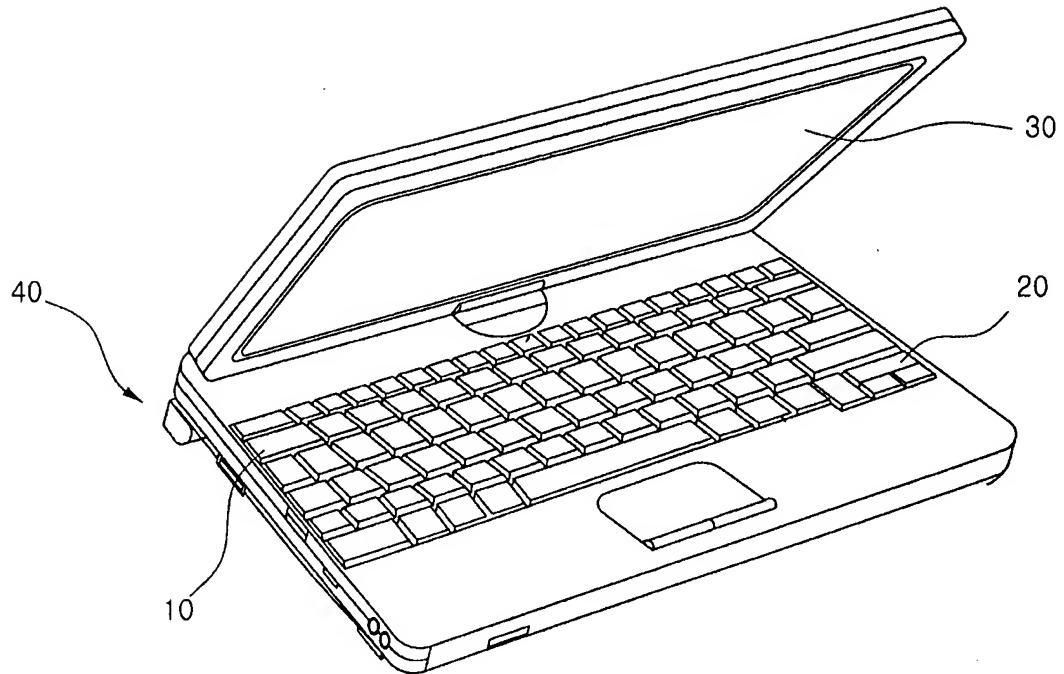


FIG. 4

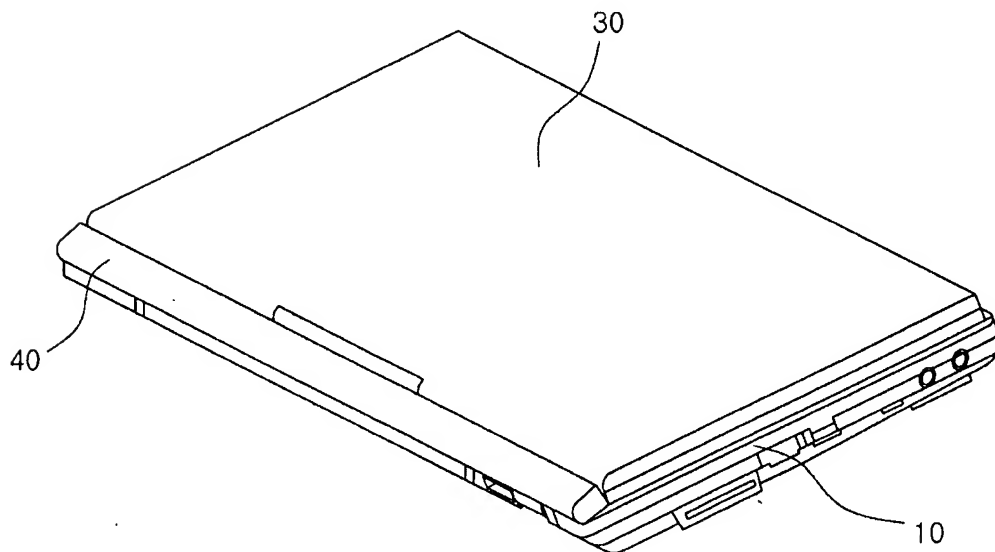


FIG. 5

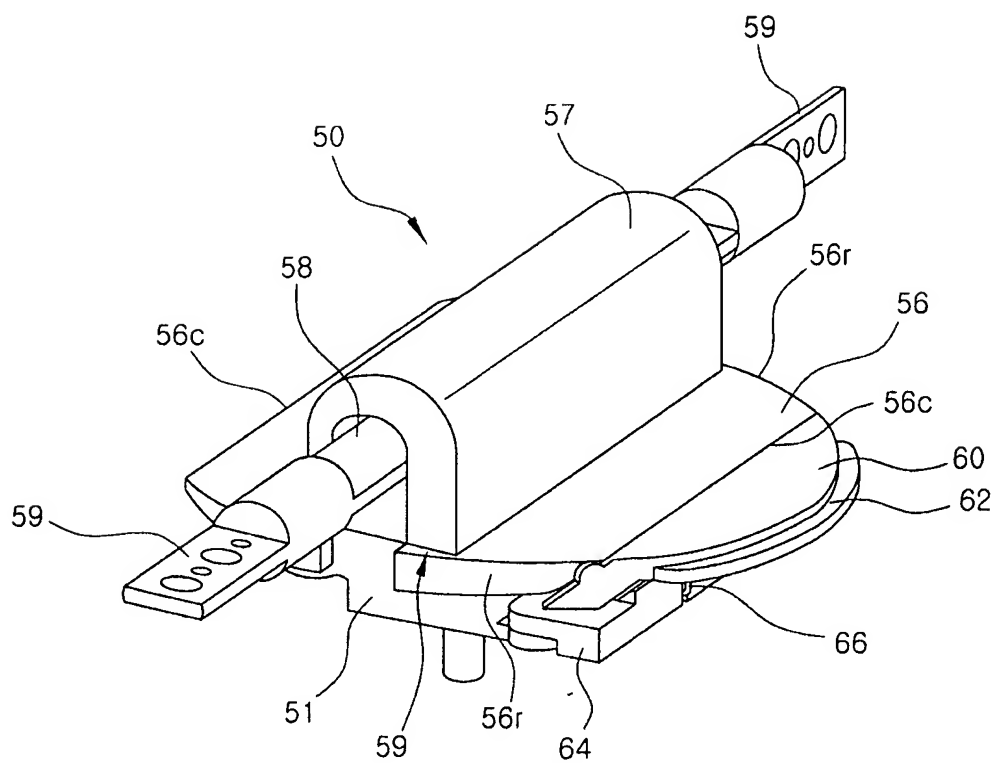


FIG. 6

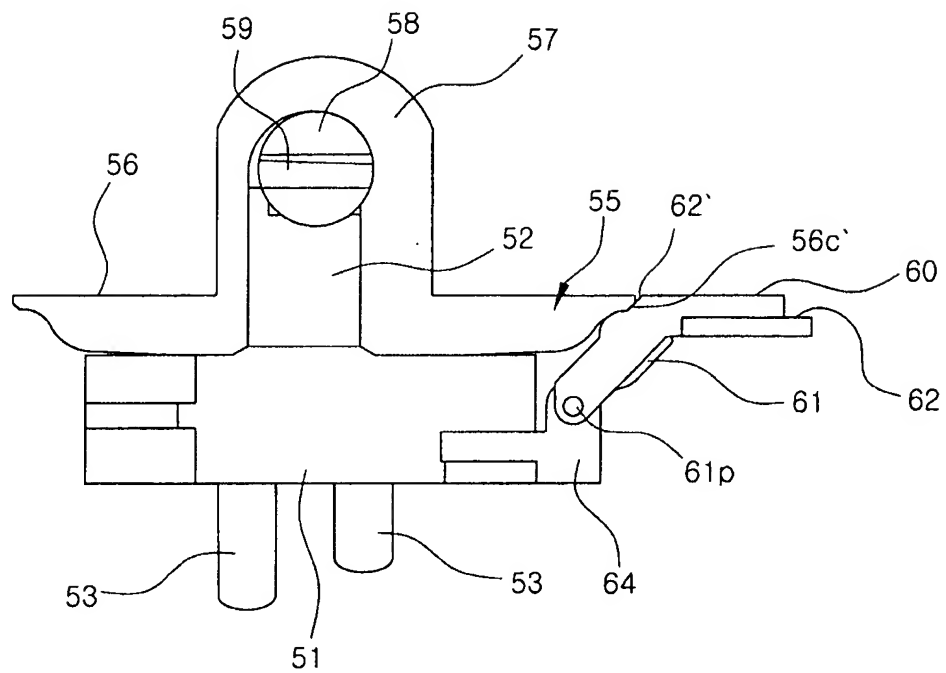


FIG. 7

